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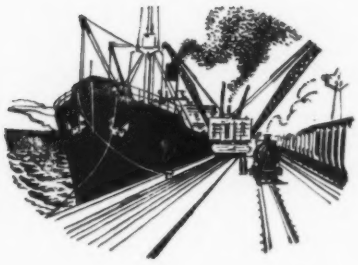
180 million dollars



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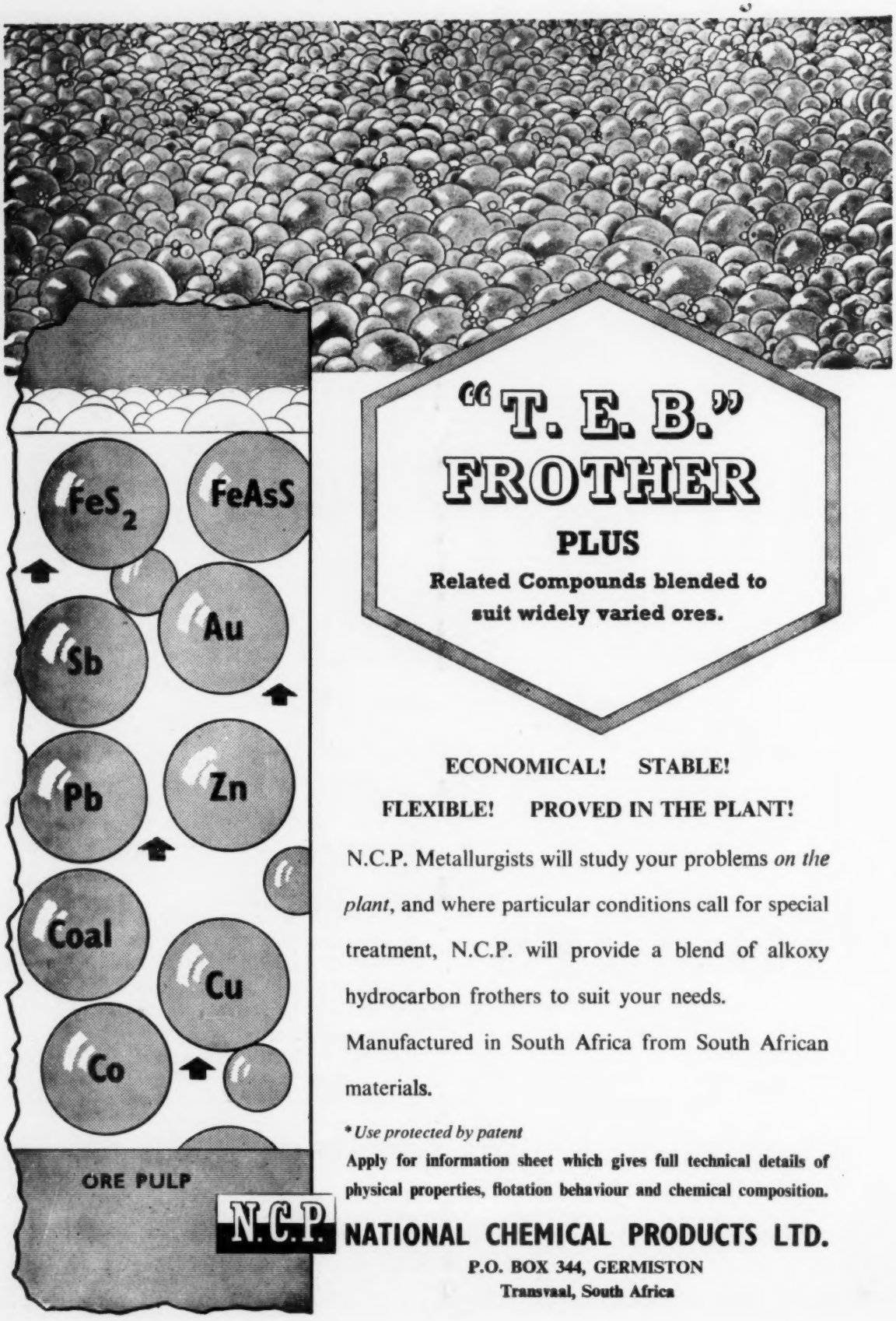

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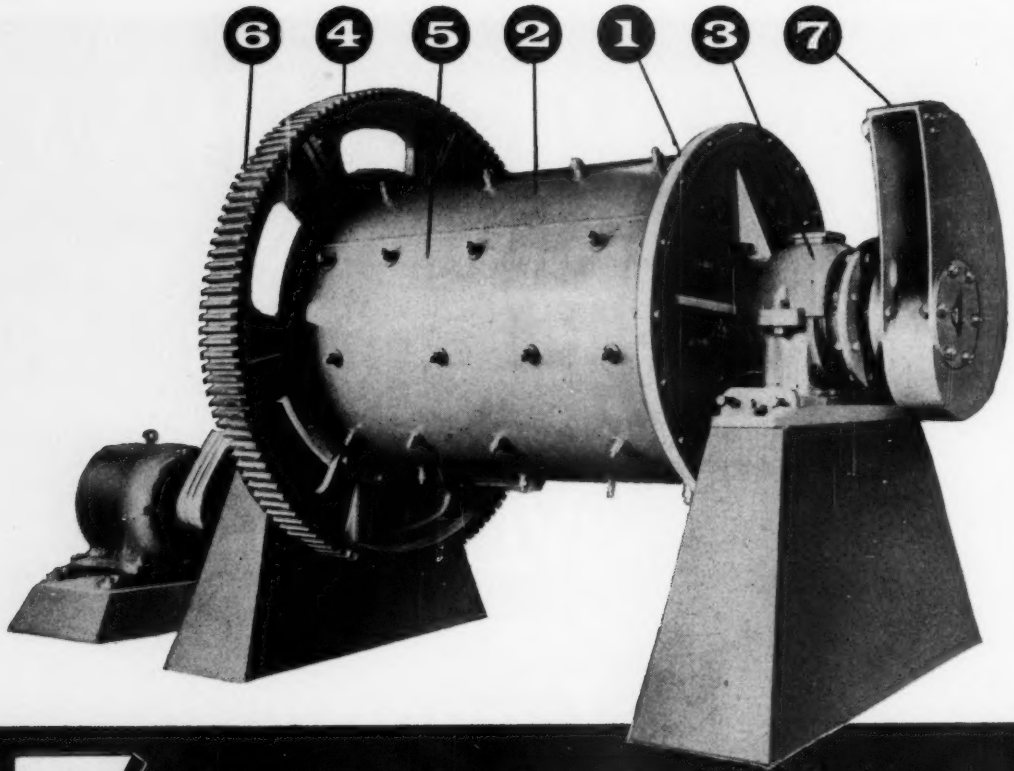

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Spotlight on Britain's Non-Ferrous Mining Prospects

THERE can be no question as to the desirability of encouraging the expansion of non-ferrous mining in Great Britain and Ireland, provided it can be shown that metals can be produced as cheaply at home as they can be obtained from overseas. In view of the growing world demand for metals and minerals which is anticipated in the years ahead, any significant addition to the available resources would be an important gain. Increased production from domestic sources has the further advantages of conserving foreign exchange, reducing our vulnerability in the event of war, and providing new fields of employment in one of the country's oldest industries. But experience elsewhere has shown that an industry which cannot compete economically with imported products is apt to become more of a liability than an asset in normal conditions of supply.

Unfortunately, there have been many half-hearted attempts to revive Britain's once prosperous non-ferrous mining industry. The failure of these abortive efforts has engendered a spirit of defeatism or scepticism which has become the main stumbling block in the way of those who believe that the potentialities are sufficiently attractive to merit systematic examination.

It is with the intention of obtaining an authoritative picture of our domestic mineral potentialities based on technical appraisal of the available data, that the Institution of Mining and Metallurgy, in co-operation with the United Kingdom Metal Mining Association, has organized a "Symposium on the Future of Non-Ferrous Mining in Great Britain and Ireland", which is to be held at 21 Tothill Street, Westminster, London, S.W.1, on September 23 and 24, 1958.

Co-operation has been readily forthcoming from other bodies, among them the Cornish Mining Development Association, which arranged for the submission of two papers dealing respectively with Cornwall's mineral potential and the practical considerations involved in unwatering and developing old Cornish mines.

This event comes at a time when the world mining industry is still suffering from the combined effects of over-production and the American recession, which have led to a steep fall in the prices of most raw materials. It is perhaps as well that the investigation should be held under these conditions, which are conducive to realistic thinking, rather than at a time of high prices and unlimited demand, when excessive prosperity might produce a tendency to view future problems through rose-coloured spectacles.

The symposium might be described as a compendium of the best technical opinions on the known deposits and on the chief potentialities that can be deduced from them. In addition to the mining potentialities the symposium will cover the economic and financial aspects and the vexed question of mineral rights, which will be discussed by two authorities, one in favour of nationalization and the other against it. The very relevant problem of taxation will also be examined.

What might almost be termed a small symposium within the greater one will be provided by a composite paper containing sections by experts on aerial geophysical surveying; photogeological

interpretation of air photographs; geochemical prospecting; resistivity and self-potential, electro-magnetic and magnetometric, and shallow seismic methods; diamond drilling and ore testing. By narrowing the target area geophysical and other technical aids to exploration can play a key part in the economical location of buried minerals such as the tin lodes of Cornwall, which may well prove far more extensive than is at present believed. Further details of the important session which it is proposed to devote to exploration will appear in the next issue of the I.M.M. Bulletin.

In the concluding session a pattern for the revival of mineral exploration in the British Isles will be set out. This will be based on experience in Australia which was faced with a similar problem after the war. Australia's efforts to revive her mining industry have proved remarkably fruitful, due to a systematic approach to the problems of exploration and development by the government and private enterprise acting in close co-operation. A similar approach in Britain might prove equally successful. There is certainly favourable evidence for the development of potentially mineralized areas in the British Isles in spite of the obvious difficulties, particularly when it is borne in mind that the exhaustion of old deposits may be more apparent than real and that most old shafts are small in cross-section by modern standards. Recent experience in Eire has shown that, despite centuries of mining, the surface has barely been scratched by the older equipment and methods.

It is axiomatic that a mining industry cannot thrive unless the problems confronting it are appreciated by the government. The organizers of the symposium are hopeful that if it can be demonstrated by objective technical appraisal that Britain has mineral deposits which are capable of economic exploitation, the government will give sympathetic consideration to the creation of a more favourable tax climate for mining expansion. It is understood that every effort is therefore being made to ensure that the symposium will be attended by all those in government circles whose understanding and co-operation are essential to the revival of non-ferrous mining in the U.K.

Great importance is attached to thorough preparation and planning for the symposium, the aim being to have as many people as possible thinking about the problems well in advance, so that they may come fully prepared, and worthwhile discussions may result. The first circular containing a provisional programme and synopses of papers has already been released. It is hoped that preprints will be issued about August.

The symposium might be described as an act of faith. Whatever the outcome, the organizers will have rendered valuable service to the mining industry and to the country. If the verdict is sufficiently favourable, the Doubting Thomases will be conclusively silenced. On the other hand, if critical examination of the technical evidence holds out little hope that the industry can be revived on a sound and economic basis, we shall at least know where we stand.

RETRENCHMENT IN MALAYA

Several miners in the Federation of Malaya who have already completed their quota for the current quarter have decided not to continue mining operations, as the prospect of an early improvement in the world tin position appears to be remote.

During April, 12 dredges and 27 other mines were closed down, as a result of which 2,584 workers lost their jobs.

The monthly report of the Federation's Ministry of Labour and Social Welfare, in referring to the employment situation in the tin mining industry, states that the fact that workers have been retrenched from the mining industry does not necessarily mean that they have become unemployed, or are in need of relief. Chinese labourers in particular, says the report, can usually find some form of alternate work, and, it should be remembered, earnings in the industry have been high for some years.

Many retrenched workers have other members of the family in work who can help during the present recession. The Ministry states that enquiries made in several areas have indicated that there is no distress yet resulting from unemployment; though the numbers of unemployed in some of the new villages in Perak are causing some concern.

State Governments have agreed to grant to retrenched mining labourers facilities for taking up land for cultivation purposes on temporary occupation licences on mining land. Employers in the industry also have agreed to assist in making land available for cultivation, by their own employees, on their mining leases.

Mining employers, especially the dredging companies, continue to do their best to retain their labour forces by providing work on rotation or by shortening the number of working hours.

MINING IN ROMANIA

Next to the Soviet Union, Romania is at present the most important oil producing country in Europe. The highest output of crude before the war, 8,704,000 tonnes in 1936, was followed by a downward movement, until, war conditions contributing, the lowest annual level, 3,505,000 tonnes, was reached in 1944, the year of the country's liberation. Efforts to reverse the situation proved successful, assisted as they were by Sovrompetrol, a mixed Soviet-Romanian oil concern, dissolved in 1954. The output of crude showed the following curve: 1950, 5,460,000 tonnes, 1953, 9,300,000 tonnes, 1955, 10,555,491 tonnes, 1956, 10,920,467 tonnes. The second five-year plan, 1956-1960, envisages a minimum of 13,500,000 tonnes of crude for its final year.

In recent years, Romanian exports of crude oil have been greatly expanded, the main markets being Poland, Hungary, Western Germany, Eastern Germany, Turkey, Bulgaria, Yugoslavia and Italy, in addition to the U.S.S.R.

The "First of May" engineering works at Ploesti, the main refining centre on the southern fringe of the Prahova fields (a former repair shop), now produces high-speed drilling rigs which are also exported.

Second in importance is the methane industry centred in Transylvania (central Romania). Output totalled 154,487,308,800 cu. ft. in 1956. For a number of years methane has been the main fuel (supplied by pipeline) in Bucharest for households and industry, and the new Moldavian methane deposits will be connected by a 375-mile pipeline (under construction since 1957) to the two siderurgical centres of Hunedoara and Resita in south-western Romania, the mainstays of the country's iron and steel industry.

The output of iron ore in the same region (694,345 tonnes in 1956, the last year for which official data are available), was five times higher than in 1938 (139,185 tonnes). At Hunedoara (bigger than the Resita undertaking) a sixth blast furnace (capacity 700 tonnes) — the largest in Romania — was completed in 1956. In the first half of 1957 two electric ovens (capacity 20 tonnes each) were placed in service at Hunedoara where five Martin ovens (185 tonnes each) are still under construction. Two coke batteries (annual capacity 200,000 tonnes each) using

brown coal from the Lupeni mine (Jiu Valley to the south-east of Hunedoara) were placed in service at Hunedoara, and one was completed in Resita. At the third siderurgical centre, Roman (in north-eastern Romania) the building of a seamless tube works was begun in 1956. In the same year, pig iron production totalled 582,912 tonnes and the output of raw steel aggregated 779,136 tonnes. Coal produced in Romania totalled 6,060,000 tonnes in 1956, of which about a quarter was lignite while the bulk of the balance was brown coal.

At the end of 1956 Sovromcvarcit, the mixed Soviet-Romanian company founded in 1952 for the exploitation of a uranium deposit in Transylvania, was dissolved and the deposit is now worked by the Romanian State direct. No details of the results have been released.

Salt has been mined for many decades in Romania and reserves are estimated at 2,500,000,000 tonnes. In 1957, nearly 1,100,000 tonnes was extracted — about thrice as much as in 1938.

Transylvania is also extremely rich in many kinds of ores. A manganese deposit currently being worked has an Mn content of 42-46 per cent, the reserves being estimated at 250,000 tonnes. Further to the north-east near Brosteni, in Moldavia, is situated the country's largest deposit of manganese ore with reserves of 5,500,000 tonnes, which yields ore containing 36 per cent of Mn and 9 per cent of Fe. Copper ore, chrome ore, lead and antimony ore have been mined in Transylvania on an increasing scale in recent years contributing to the country's industrialization, but zinc ore has not so far been discovered in Romania.

AUSTRALIA'S EXPANDING STEEL INDUSTRY

Demand for steel in Australia continues strong, and has not followed the general overseas trend. The Broken Hill Proprietary Co. and its subsidiary, Australian Iron and Steel, are operating to capacity and imports of steel are declining, due largely to the ability of these companies to meet requirements.

In the past year Australian Iron and Steel spent £A3,000,000 on expansion of the works at Port Kembla, New South Wales, where the labour force has expanded by 66 per cent in the last five years. As a major stage in the programme, a new steel rolling mill, built at a cost of £A8,750,000, has just commenced work at Port Kembla; it has a capacity of 2,000,000 tons per year and is designed for extension to a rolling capacity up to 3,350,000 tons of ingots annually. The other primary rolling mill at the works has a capacity of 1,800,000 tons per year. The new mill will receive ingots of 30 tons and will feed the hot strip mill, for the product of which there is a heavy, and growing demand. The company's collieries have been extended and mechanized for greater production and in order to supply adequate coke to the works, an additional 96 coke ovens are being built, together with a by-product plant.

One problem lies in the relatively small reserves of iron ore in Australia. Sources of supply are the Iron Monarch and Iron Baron mines in the Middleback Ranges in South Australia; these mines, in addition to meeting the increased demands of the works in the Eastern States, will be called on by the projected steel plant to be built in South Australia, but supply should be assisted by the reserves reported to have been established by the South Australian Government's drilling, stated to total 30,000,000 tons, and which under the agreement made between the government and the company, will now be available to the latter. Western Australia supplies a considerable tonnage of ore from Yampi Sound to the Port Kembla works.

The Broken Hill Proprietary Co. is carrying on an active campaign of geological investigation and diamond drilling in the far north of Queensland where there are one, or more, large iron occurrences. These are remote from the point of utilization and tonnage and grade, are important factors. It is inevitable that smelting grade must decrease from the 65 per cent ore which has been supplied for so long. One source of low-grade ore is in the jaspilites which occur extensively in the vicinity of the high-grade ore deposits in the Middleback Ranges, and the Broken Hill Proprietary Co. is now engaged in extensive experimental work for their utilization.

CHINA OUTPACING THE N.C.B.?

An article published in the Peking newspaper *People's Daily* on May Day this year expressed confidence that in 1959 China's output of coal would surpass that of Britain. This estimate was based on the assumption that Britain's output in 1959 would be in the region of 230,400,000 tons and that China could maintain the level of 500,000 tons daily achieved in April this year.

This advance, if accomplished, would be a striking one, in view of the fact that China's output for the current year is not expected to exceed 180,000,000 tons—a figure, however, which represents an advance of 50,000,000 tons over 1957. It is also noteworthy that the increase projected for the current year is to be attained only partially as a result of improved output in the mines, run centrally by the Ministry of the Coal Industry, which increased production by about 33 per cent during the first four months of this year. It will also be due in no small measure to increased output in local mines, which produced only 36,000,000 tons last year but are expected to reach an annual output of as much as 160,000,000 tons in 1962.

It is claimed that there is coal to be won in 1,500 of the 2,000 counties of the Chinese People's Republic. An important fact mentioned in this connection is that the time taken to open up a new pit has been substantially reduced; whereas it used to take 26 months, on an average, to open up a mine with an annual capacity of 300,000 tons, and 44 months to open up a larger one, these times have been cut to 12 and 38 months respectively.

Work is to begin this year on new pits with a total maximum capacity of over 70,000,000 tons.

PAY CLAIM REJECTED

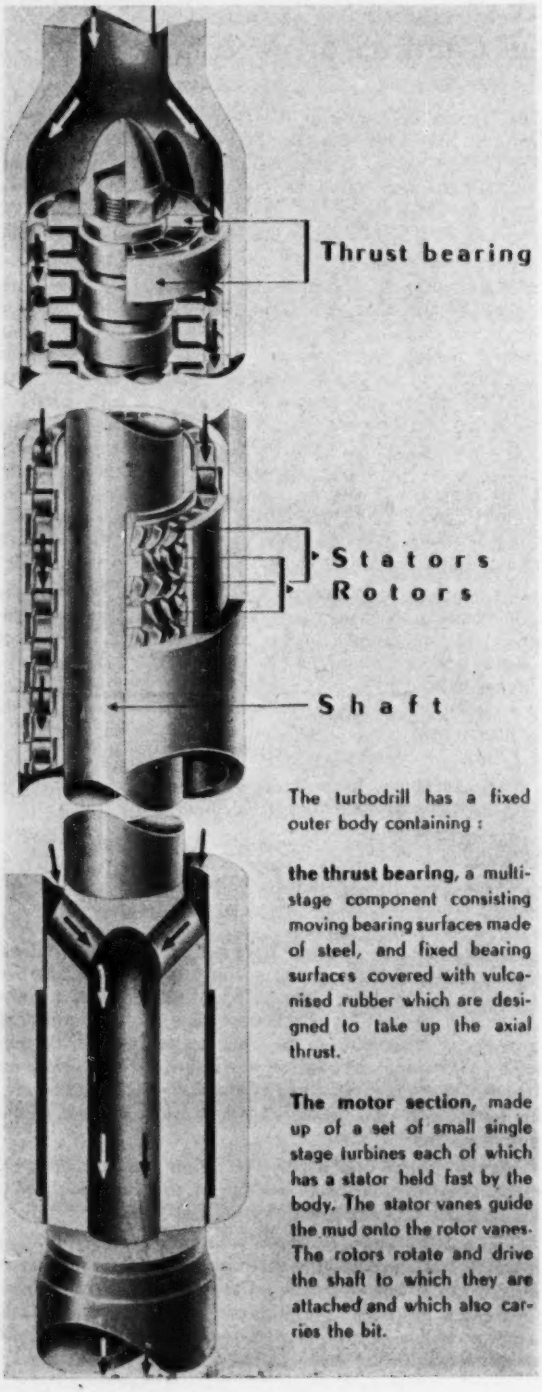
The National Reference Tribunal for the British Coal Mining Industry has rejected a 10s. a week pay claim for 380,000 day-wage men. The Tribunal also rejected a claim for a 40-hr. week for 190,000 surface workers although agreeing to a reduction in the working hours for 8,000 men employed in the carbonization section of the National Coal Board. This reduction means that employees in coking plants will now work 42 hrs. weekly instead of the present 48 hrs.

One big concession which the union has gained is the introduction of a sick-pay scheme to cover all workers in the industry and not just officials as at present.

Commenting upon the Tribunal's findings the president of the N.U.M. expressed dissatisfaction at the rejection of the pay claim but asserted that the award was binding on both sides. However, acceptance does not preclude the submission of a new claim which will be prepared and discussed at the mineworkers' annual conference in July.

The Development

ALTHOUGH the idea of a turbodrill was first mooted in America by a man called Cross in 1873, it was not until September 19, 1922, that Mathiew Kapelioushnikov, an engineer from Baku, applied for a patent, which was granted two years later. About the same time, two French engineers, Lachamp and Perret, also obtained patents for a fast turbine with speed reducing gear, but their tests were later abandoned. The Russians, however, successfully concluded their research work and the first non-experimental turbodrill based on the Kapelioushnikov patent was produced in the U.S.S.R. as early as 1925.



The turbodrill has a fixed outer body containing :

the thrust bearing, a multi-stage component consisting moving bearing surfaces made of steel, and fixed bearing surfaces covered with vulcanised rubber which are designed to take up the axial thrust.

The motor section, made up of a set of small single stage turbines each of which has a stator held fast by the body. The stator vanes guide the mud onto the rotor vanes. The rotors rotate and drive the shaft to which they are attached and which also carries the bit.

Over the next ten years, however, both in Russia and elsewhere, the turbodrill was found to have a number of disadvantages compared with the rotary drill, including the fact that bladings could not stand up to the necessary flow velocities of from 60 to 70 m/s and that reduction gear could not be adapted to the operating conditions at the bottom of the well.

With the evolution of the multi-stage turbine, however, it became possible to think in terms of driving the bit directly at speeds ranging from 600 to 1,000 r.p.m. and of applying much greater weights to the bit. In overcoming the serious practical difficulties that still remained to be solved over a number of years, the Russians based their successful efforts on the use of special steels and flexible bearings.

Although a patent for a multi-stage Sharpenberg turbine was granted in America in 1924 and one was built and tested by the Standard Oil Co. of California, the shallow depths of the U.S. oil-bearing formations did not provide the same incentives for turbodrill development, though, more recently, the turbodrill division of Dresser Industries have spent some time on field testing the tool since they acquired a licence from Russia for its manufacture. Turbodrilling has, in fact, been undertaken under a variety of conditions with both Russian and French equipment. In Russia, drilling usually has to continue to depths of 3,000/3,500 m. (9,800/11,500 ft.) before oil-bearing formations are encountered.

In France, too, oil is found at depths ranging from 2,500/3,000 m. (8,200/9,800 ft.) and problems similar to those in Russia are presented.

Rotary drilling at speed to such depths has disastrous effects on drill strings, which also absorb almost all the extra power supplied at the surface. In the case of the hydraulically-operated turbodrill, however, a variation of discharge produces a proportional variation in the rotational speed, whilst the torque, which is made to match the opposing torque on the bit by adjusting the weight, varies as the square of the discharge and the power as the cube. In other words, when the fluid volume circulated is doubled, the power rises to eight times its former value and the rate of penetration is considerably increased.

Because of the pressures available for driving (several kg./cm.^{2}) and its necessarily small overall diameter, the turbine used in the turbodrill has to be a multi-stage axial type. It consists of a body, the top of which is connected to the drill string and in which are the thrust bearings which take up axial hydraulic thrust, the bearings which guide the shaft and the stators, each of which directs the fluid or mud into its corresponding rotor. The rotating part consists of a shaft, on which are packed the rotors and the moving parts of the thrust and guide bearings. The bit is attached to the end of the shaft.

The turbodrill has theoretical characteristic curves similar to those for ordinary hydraulic turbines. When plotted against rotational speeds turbodrill power and efficiency curves, drawn for a constant discharge, have a parabolic shape and their maxima correspond to the optimum rotational speed, which is about half of runaway speed. When running at this speed, efficiency is about 65 per cent, but recent laboratory tests in France have produced efficiencies of up to 68 per cent and these are likely to be improved upon by further systematic research. The torque curve is a linear function of the rotational speed.

Of Turbodrills In Europe

Since both rotary and churn drills in petroleum well exploitation are strictly limited in their mechanical capacity to transmit power from the surface to the bottom of the well, other methods have been developed, including the turbodrill, which uses hydraulically the fluid or mud normally employed for lubricating and cooling the bit and for carrying the cuttings to the surface. Considerable strides have been made in Europe in the development of this type of drill, which is usually able to produce faster speeds in deep bores, progress being specially marked in France, Russia, and Austria. The use of the turbodrill has a definite application in mining.

By JOHN GRINDROD

When the turbodrill is at a standstill the torque applied to the bit is about double that obtaining at optimum operating speed and at runaway speed torque is zero. Therefore, a reduction of speed is accompanied by an increase in torque, though not sufficient to endanger the drilling string. The pressure drop through the turbine has to be kept constant for all speeds so as to avoid pressure surges which might damage the drilling string and surface equipment.

Under actual operating conditions the torque curve takes a different form mainly on account of frictional torques in the thrust and guide bearings and reactions on the bit. Variations in discharge produce different power, torque and pressure drop curves and operators can use such a family of curves to adapt a turbodrill to varying drilling factors, especially the load on the bit.

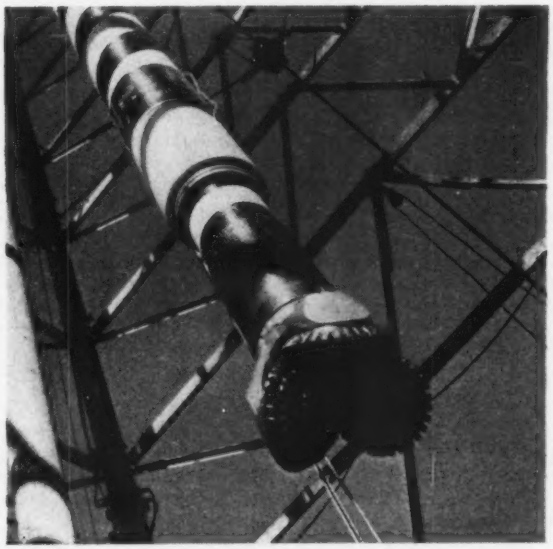
Of great importance is the relationship between the weight on the bit and the discharge since on it depends the balanced operating zone of the turbodrill running with the bearings floated. In fact, an axial thrust is set up by the driving pressure and produces a reaction as soon as the turbodrill is on bottom and the load required to compensate this reaction has to be applied. Optimum conditions are obtained when the weight applied to the whole assembly is nearly equal to the hydraulic thrust, which, like the pressure drop, varies as the square of the discharges.

In France, W. Tiraspolsky, of the Bureau de Coordination Technique, has been one of the leaders in promoting turbodrill manufacture by Etablissements Neyrpic, of Grenoble. In association with Roger Henquet, director of Société d'Etudes Petrolières, who have the exclusive distribution rights in France and North Africa, he has set up a turbodrill development service.

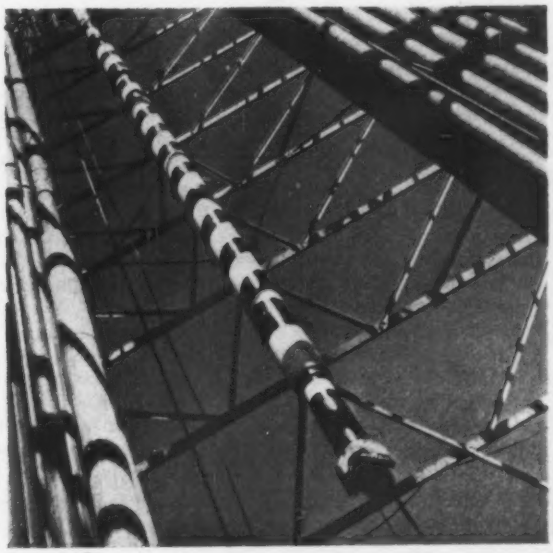
Etablissements Neyrpic make four 7¼-in. models with 110, 220, 125 and 250 stages respectively, which take 8½ to 12-in. bits, and four 10-in. models with 80, 150, 200 and 100 stages respectively, which take 12¼ to 17½-in. bits. Each stage consists of a rotor and a stator. Machines can be coupled together to give additional power. Other machines for use with smaller bits as well as 10-in. and 7¼-in. turbocoring drills for wire line core will also soon be available. French turbodrills have been used to drill wells at Lacq, Antin, Puiselet, Le Porge, Mothes and Sauvelade in France, at Li in Algeria and at Rosolini in Sicily. Tiraspolsky considers that turbodrilling has economic advantages over rotary drilling under conditions in which the turbo bit can be made to cut at least three times as rapidly as the rotary bit or where directional drilling is required.

Some information on Russian development of turbodrills was given at the Fourth World Petroleum Congress at Rome in 1955. Much work has been put into this tool by Soviet engineers and more progress has probably been made in Russia than in any other country, including the use of better rock bits, larger pumps and more resistant pipedrill. It is reported that 83 per cent of Russian wells

A close up of a turbodrill and bit



A turbodrill string with bit at the end



are now drilled by this means, hard formations being rapidly penetrated and productive zones being exploited that were hitherto unreachable with conventional equipment. According to the U.S.S.R. Ministry of Oil 984,000 ft. of hole were cut by turbodrill, multibore directional drilling in 1956—an operation for which this equipment is claimed to be very suited.

Following the use of turbodrills by the Russians in Austria during the occupation, the Austrians themselves are now using this machine, which is being manufactured by Mannesmann-Trauzl A.G., of Vienna. Austrian-made turbodrills have now been field-tested and are available in 8-in. and 10-in. sizes, a 6-in. size being at the design stage. The 10-in. drill uses 12¼ and 12¼-in. bits with a 13¾-in. casing or 14¾-in. bits with a 16-in. casing. The 8-in. drill uses 9⅝ or 9¾-in. bits with a 10¾-in. casing or 10¾-in. and 10⅝-in. bits with a 11¾-in. casing. The drilling fluid requirement of, for example, the T-2-8, 100-stage axial flow turbine with an outside diameter of 8½ in. is 10 U.S. gals. per sec., giving a nominal input of 140 h.p., 700 r.p.m. at the turbine with a pressure drop of 570 lb. p.s.i.

Although a turbodrill's overall efficiency might appear to be good compared with that of a rotary drilling rig it may be necessary to increase the power of the slush pumps for turbodrilling over that required for rotary work. When drilling at a depth of 2,000 m. (6,500 ft.) with a 10-in. turbine and a 12¼-in. bit, discharging 3,000 litres/mn. (790 U.S. g.p.m.) through a 5½-in. drill string, about 100 kg./cm.² are required, which means that the pumps must develop about 1,000 to 1,500 h.p. Similarly, a 7½-in. turbodrill and 8½-in. bit drilling at 3,000 m. (9,800 ft.) with a 5-in. drill string discharging 1,800 litres/mn. (475 U.S. g.p.m.) requires 120 kg./cm.² (1,705 lb. p.s.i.) at the surface and pumps developing about 1,000 h.p.

One of the most effective ways of increasing the overall efficiency of turbodrilling is to eliminate pressure losses. Such losses are offset by increasing the pressure supplied. If pressure is kept constant at the surface, pressure increases can only be made at the expense of discharge and a reduction in discharge is reflected by a third power reduction in the power supplied by the bit. It is considered that much is to be gained by increasing the diameter of mud lines, by cutting out useless bends, by lengthening certain curves and by improved couplings, using larger hoses, and other factors.

Increased pump efficiency and a saving in wear and tear can often be achieved by adding centrifugal booster pumps and desanding units for turbodrilling. The use of a pulsation damper also reduces pressure surges.

Suitable for drilling applications under conditions other than those appertaining to oil wells, the turbodrill has definite applications in mining.

Elasticity in Ground Stresses

THE investigation of the problem of rock movements around mine excavations by means of solutions based on the mathematical theory of elasticity has been referred to by Dr. P. Hackett, of Nottingham University, in his paper, "An Elastic Approach to the Analysis of Ground Stresses in Mining". The paper was presented at a meeting of the South Staffordshire and Warwickshire Institute of Mining Engineers on February 12, 1958.

By the selection of a suitable model, a face or working may be considered as analogous to a crack in a two-dimensional infinite medium, the solution for which has been published. The scope of the work, however, is limited to those excavations where the ratio of the width of extraction to the depth of working is less than about 0.7.

Using the solution for a crack, a condition for which is that the coal seam must be considered to be perfectly rigid, a general picture of the stresses, strains and displacements resulting from the excavation may be calculated.

The results show that there is a zone of vertical tension over the excavation which would account for the phenomenon of bed separation. Also the configuration of the lines joining points of equal stress magnitude show that there may be a connection between the maximum principal stress and cutter breaks, and between the maximum shear and induced cleavage.

This simplified approach is then modified to accommodate the effect of a free surface at the chosen ground level, the inevitable crushing of the coal at the rib-sides, and the closure of the excavation which occurs in the centre of a panel. These modifications make the theoretical displacement curves more realistic, and remove many of the objections to the initial simplified approach.

The method was noted in *Iron and Coal Trades Review*, Vol. 176, No. 4, p. 694.

Iron Ore Quarry in South Australia

IRON BARON, a township 15 miles inland from the west coast of Spencer Gulf, South Australia, has sprung to life after 17 years of dormancy with the re-establishment of a large iron ore quarry. Production of iron ore began in January with new equipment and plant installed by The Broken Hill Proprietary Co. Ltd. Total cost of the project was £1,300,000.

Mining is by opencut methods, and production is expected to build up steadily to a rate of 1,000,000 tons a year.

The two orebodies are being developed in a series of 50-ft. benches commencing from the top of the hills. Drilling will be carried out by two Bucyrus-Erie blasthole drills, drilling holes 9 in. in dia. for the full depth of the face; 10,000 to 20,000 tons of ore are shot down by the action of a single blast.

Two Marion electric shovels, each of 6 cu. yds. capacity, will dig the ore and load it into heavy-duty Mack off-highway trucks for transport to the primary crusher. Seven of these trucks are being used, each with a net carrying capacity of 30 tons. The bodies and hydraulic hoists were manufactured in Australia.

At the primary crushing plant the ore will be dumped on to a large pan feeder, feeding at a controlled rate to an 84-in. by 60-in. jaw crusher. This machine was manufactured in Sweden and is equipped with roller bearings and v-belt drive from a 250 h.p. electric motor. From here the ore moves by belt conveyor to twin 5 ft. 6 in. Jacques gyratory crushers, where it is reduced to approximately 2½ in. maximum dia.

Finally, it is elevated by further conveyor belts to the four silo train-loading bins, each having a live storage capacity of 2,000 tons. The quarry has been described in *Chemical Engineering and Mining Review*, Vol. 50, No. 5, Melbourne.

Methods of Uranium Recovery in the U.S.A.

During 1957 the uranium milling industry of the United States continued to develop, more than half of the uranium concentrate produced being extracted by the acid-leach resin-in-pulp method. This process, and that of solvent extraction, were described fully in the Catalogue, Survey and Directory number of *Mining World*, 1958. It is indicated that possibly the resin-in-pulp method may have future applications in the treatment of metals other than uranium.

IT would appear that solvent extraction and resin-in-pulp ion exchange are the favourite methods of uranium recovery on the Colorado Plateau, and it is claimed that both methods have the advantage of being able to treat a wide variety of ores to provide a high throughput potential.

The Resin-in-Pulp Process

The resin-in-pulp process recovers dissolved uranium from acid slime pulp by adsorption on anion exchange resin beads. In six mills using the RIP process, acid-proof screen baskets are used to contain the resin beads. These baskets oscillate up and down in a trough through which flows acid-leached slime pulp. One of the mills, that of Western Nuclear Corp., reports the method to provide a "very high recovery", although the process is limited by the particle size of the solids in the pulp, being best adapted to ores that can be leached at a relatively coarse grind. It is said that the −325 mesh fraction should not exceed 30 per cent to 40 per cent.

Good sand-slime separation is also said to be essential. This factor is provided by a counter-current washing system using Esperanza drag classifiers and cyclones. Thus the washed sand can be discarded and the cyclone overflow sent to the RIP section.

Equipment to utilize anion exchange resin beads in a slime pulp in a true continuous counter current flow was designed by Infilco Inc. in Arizona. In this instance it was claimed that the gentle machine motion would not degrade the anion exchange resins currently on the market.

A modified design of this equipment is used by Union Carbide Nuclear Co. Permutit resin was used in tests, as a result of which Sweco vibrating screens are employed to separate resin beads from an acidified slime pulp containing 20 per cent solids. This pulp contains three times the quantity of slime that can be tolerated in any of the RIP plants using baskets. This adaptation took place at the Maybell plant in Colorado, and metallurgical results are reported as being markedly satisfactory, erosion of the resin beads being within tolerable limits.

Should time confirm the efficiency of these results, it may be that the resin-in-pulp process will find application in the treatment of metals other than uranium.

Further Developments

Breakage of the screen cloth used in the acid-proof, oscillating screen baskets proved a major disadvantage in many plants. Baskets in which the screen cloth is held under tension were designed and installed for Western Nuclear by Western Knapp Engineering Co. Since this installation commenced operation, no screen break because of flexing has been reported.

The eluex system is to be added to the resin-in-pulp of Mines Department Inc., South Dakota, so that all tailing water can be returned to the process. In this installation the Permutit anion exchange resin beads will be eluted with 10 per cent sulphuric acid solution, the uranium subsequently being recovered by solvent extraction. The strong barren acid that remains after the uranium has been removed will be used to acidify the pulp in the leach, and will also be recycled for eluting uranium from the RIP circuit. Mill tailing water overflow from the slime pond will be recycled to the mill to find a use as a wash in the sand washing circuit.

A great advantage inherent in the RIP process is that an extremely low soluble loss is experienced, averaging between 0.1 and 0.4 per cent of dissolved uranium from ore.

Solvent Extraction

In every uranium mill using solvent extraction, the extracting organic is dissolved in paraffin. This paraffin mixture then flows counter currently to the acid aqueous pregnant solution through equipment that alternately mixes and then separates the paraffin mixture and the aqueous solution.

At the Vitro Uranium Co. plant in Salt Lake, solvent extraction has replaced the phosphate recovery method previously used to win the 600 tons per day output. Vitro uses dodecyl phosphoric acid dissolved in paraffin to recover uranium from acid aqueous pregnant solution. Automatic control features in this plant, as careful adjustment is required for good operation of the interface between the immiscible liquids, the density of the evaporator distillate and the flow of the solution to the plant.

The Dow Chemical Co., California, is responsible for most of the research work with dodecyl phosphoric acid. Uranium is recovered from the acid pregnant organic solution by counter current treatment with concentrated hydrochloric acid. Excess hydrochloric acid is distilled and recovered for re-use.

Texas-Zinc Minerals uses a Rhom and Haas amine, named 9D-187, that acts as a liquid anion exchange agent in contrast to organo-phosphoric acids which act as cation exchange agents. The amines possess two advantages over organo-phosphoric acids; they do not extract ferric iron from aqueous acid pregnant solutions, and uranium can be stripped from the organic with a relatively cheap acidified sodium chloride solution.

The solvent extraction process has not yet advanced to the point where it can be used in slurries such as can be treated in the RIP process. This means that the leached pulp must be washed substantially free of uranium before mill tailing is discarded to waste. Soluble loss of the uranium in the washed tailing should be charged against solvent extraction when profits from that method are compared with profits from an RIP plant.

Another important cost in the solvent extraction treatment is the loss of organic in the raffinate. This loss amounts to approximately ½ gal. for each 1,000 gal. of aqueous pregnant solution treated.

Fluorspar in the Soviet Union

IN view of the rapidly growing crude steel and virgin aluminium production in the U.S.S.R., and since practically all fluorspar deposits are far removed from industrial consuming centres, it is reasonable to assume that after World War II the Soviet Union found it more and more difficult to supply domestic fluorspar requirements and had to import increasing quantities from its satellites; mostly East Germany and to a lesser extent perhaps Communist China and North Korea. Considering the rapid industrial development in most Soviet *bloc* countries, it seems probable that the fluorspar supply picture of the U.S.S.R. and the entire *bloc* is gradually worsening. In support of this assumption several of the U.S.S.R.'s European satellites find it necessary to import cryolite and other fluorides from Free World countries, and in an article in *Pravda*, December 4, 1957, Pyotr Antropov, Soviet Minister of Geology and Conservation of Mineral Resources, stated that it was necessary to intensify the search for fluorspar deposits in the U.S.S.R.

The total fluorspar reserve in the U.S.S.R. was estimated shortly before World War II at 13,500,000 tonnes, of which 2,700,000 tonnes was measured. Eliminating the submarginal deposits, however, the total workable reserve probably did not exceed 9,000,000 tonnes, of which an estimated one-third has been mined in the past 20 years.

Geology of the Principal Deposits

All principal fluorspar occurrences of the U.S.S.R. are of hydro-thermal origin. The high-temperature deposits are usually associated with granites that have been transformed into greisen near the contact zone. The fluorspar is massive crystalline and is usually associated with quartz. The Solonechnoye deposit (Transbaikal) is of this type.

Deposits of the intermediate temperature range are usually found near granite massifs. The fluorspar forms massive aggregates and is accompanied by quartz, barytes, non-ferrous base metal; and iron sulphides, haematite, and calcite. Often the base-metal content is sufficient to make it the primary object of the mining operation, while the fluorspar becomes a by-product. Examples of such occurrences are: Abagaytuy (Transbaikal), Aurakhmat (Kazakh Republic), Takob (Tadzhik Republic), and Amderma (on the shores of the Kara Sea).

The low-temperature deposits are usually several miles from the granite massifs. They form parallel, elongated or concentric deposits usually containing kaolinite, amorphous silica, and sometimes antimonite or cinnabar. The latter two minerals often become the principal products with fluorspar as a by-product. Examples of this type are Kalanguy (Transbaikal) and Khaydarkan (Central Asia).

Most of the occurrences in the Transbaikal form vein-like deposits in fissures. Reaching considerable thickness, they are sometimes filled with breccia consisting of surrounding rock fragments which were cemented by fluorspar.

However, the deposits at Aurakhmat and Amderma, which are similar to those in Kentucky and Illinois, U.S.A., are metasomatic deposits formed by replacement of limestone with fluorspar. These deposits are usually lens shaped, bedded, or occur in pockets.

Assuming that the finished fluorspar consumption pattern in the U.S.S.R. is similar to that in the United States, the Soviet consumption for the 20 years—1938-57—was 2,150,000 tonnes. In the United States total fluorspar consumption is about 0.45 per cent of steel production. Crude steel production in the U.S.S.R. amounted in 1957 to 51,100,000 tonnes, on which basis finished fluorspar consumption may be estimated at 229,950 tonnes.

During and after World War II the U.S.S.R. obtained its entire domestic fluorspar supply from domestic sources. After the war the Soviet Union proceeded with its plans for the construction of fluorspar mills (*Pravda*, March 13, 1948). However, it appears that requirements for finished fluorspar increased more rapidly than the capacity of domestic plants. The U.S.S.R. began to import larger quantities of fluorspar from its satellites.

During the past six to seven years an estimated one-third of the Soviet fluorspar needs was satisfied by imports. The imported tonnage, however, accounted for approximately one-quarter of the total estimated quantity consumed in the U.S.S.R. during the last two decades. Thus domestic production of finished fluorspar during the 20-year period — 1938-57 — was approximately 1,600,000 tonnes. Assuming an average 50 per cent concentrate yield, a crude fluorspar production of over 3,000,000 tonnes during the same period will have exhausted a significant portion of the marginal fluorspar reserve reported on January 1, 1938, which—as previously indicated—appears to have been approximately 9,000,000 tonnes. It is therefore assumed that the remaining total marginal reserve is approximately 6,000,000 tonnes.

Future Outlook

According to various sources the fluorspar reserves of the principal fluorspar-producing countries in the Sino-Soviet *bloc* are approximately as follows, in tonnes:

	Reserves	Estimated production of finished fluorspar, 1956
U.S.S.R.	6,000,000	150,000
East Germany ..	1,000,000	80,000
China	1,500,000	50,000
North Korea ...	100,000	10,000
Total	8,600,000	290,000

In 1956 the countries of the Sino-Soviet *bloc* produced about 68,000,000 tonnes of steel and required approximately 305,000 tonnes of finished fluorspar to supply their industrial needs. Although there was a small production of fluorspar in the East European countries of Czechoslovakia, Hungary, and Bulgaria, this production, as evidenced by the small shipment of natural cryolite and other fluorides from Free World to Soviet *bloc* countries, does not make up for the deficit.

In view of the increasing production of steel and aluminium in the Sino-Soviet *bloc* countries, the increasing Soviet demands upon its satellites will undoubtedly be more and more difficult to meet. It is possible that the Soviet Union will turn to its fluorapatite deposits to supplement its fluorspar production. The extensive apatite deposits (reserves estimated at about 2 billion tonnes), containing approximately 1 per cent F in the apatite, are currently mined at the rate of over 3,000,000 tonnes annually and present a large potential source of fluorine.

This article is condensed from "Mineral Trade Notes", Vol. 46, No. 2, a publication of the U.S. Bureau of Mines.

MINING MISCELLANY

Pakistan has signed a barter trade agreement with Mainland China for the purchase of Chinese coal in exchange for Pakistani cotton.

★

Japanese mining engineers and geologists have filed requests for mining rights over an area of 50,000 hectares in the Potrerillos area of the province of Atacama, Chile.

★

The Union Carbide Corporation has obtained options over manganese deposits in Western Australia, 1,300 miles north of Perth. Prospecting and development activities are to start late in June in the hope of developing an extensive deposit.

★

Under an agreement between the American Point IV authorities and the Chilean Government, the coal mining companies of Lota and Schwager are to receive peso loans equivalent to U.S.$2,500,000 resulting from the sale of American surplus agricultural products for modernization of the mines.

★

Construction has started of a chemical plant near Loveland, Colorado, U.S.A., for the processing of beryl ore, it has been announced by Mineral Concentrates Inc. The plant, when completed, will represent an investment of approximately $250,000 and will produce beryllium hydroxide from beryl mined in the Crystal mountain area.

★

Iron ore shipments down the Great Lakes are moving at the slowest pace in 20 years according to the initial report of the American Iron Ore Association for the 1958 navigating season. Up to May 31 shipments from northern Lake ports, both U.S. and Canadian, totalled 4,123,171 gross tons, which compares with shipments of 16,714,273 tons for the corresponding period of last year. According to an estimate by the M.A. Hanna Co., probably not more than 125 U.S.-registered ore vessels, or roughly one-half of the Lakes fleet, was in service.

A high-grade iron ore mine about 15 miles from Blantyre, Nyasaland, went into commercial production May 27. It is geared for a production of from 3,000 to 5,000 tons a month and the production target for the end of next year is 10,000 tons a month.

★

The four-stage £6,000,000 development programme of Nchanga Consolidated Copper Mines Ltd. comes to a finish in September, 1958, by which time the mine's opencast pits will be among the most highly mechanized in the world. In August a 400-ton excavator will be stripping overburden at the rate of 30 tons a minute. The overburden will be placed on a three-mile conveyor belt, which in turn will bring it to a new 70 ft. high, 300-ton stacker machine. When this machine's boom is in a horizontal position, it will be 250 ft. long. With the bucket wheel excavator stripping at the rate of 1,840 tons an hour, the man-made hills to the north of the mine township will rise appreciably higher by the day.

★

A report from Toronto announces the uncovering of a new high-grade ore zone by Opemiska Mines. Diamond drilling has outlined a section of ore 150 ft. long, averaging 5.04 per cent copper, with an average width of 10.5 ft. The zone, known as No. 8, lies between the 400 and 525 ft. levels of the Springer mine.

★

A technical team from the U.S. Export-Import Bank recently visited the Rio Turbio region in Argentina to study and report back on the coal resources in relation to a possible credit for transporting the coal to the sea and providing ships and machinery.

★

Noranda Mines, McIntyre Porcupine Mines and United Canadian Exploration Co. have agreed to finance the development and production, if justified, of the copper, zinc and silver deposit owned by Mattagami Syndicate in north-west Quebec. The finds are located in the Watson Lake group among thirty claims in Galinee township, ninety miles north of Senneterre. Diamond drilling is reported to have indicated 14,000,000 tons averaging 13.5 per cent zinc, 0.65 per cent copper, 1.11 oz. per ton of silver, and 0.016 oz. of gold. The deposit was not demarcated.

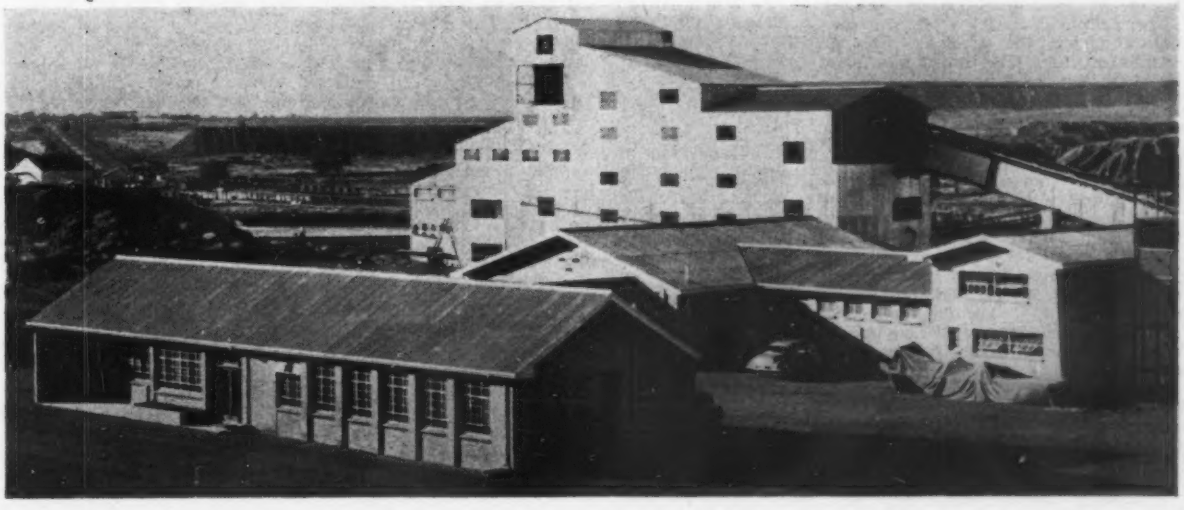
★

A hydro-electric station—the northernmost in the Soviet Union—is being built on the River Mamakan near the 58th Parallel, in the permafrost zone in Siberia. The construction site is more than 600 miles from the nearest railway station. The projected reservoir will hold 44,000 million gallons. The electricity which the Mamakan station, with a capacity of 60,000 kW., will start generating in 1960, will assist towards promoting the development of the Bodaibo gold mines. A plentiful supply of power will be available for the Mamakan-Chu district, which contains the largest mica mines in the U.S.S.R. At present the Bodaibo area relies on a small thermal power station which uses coal brought by barges along the rivers Aldan and Lena from 1,200 miles away.

★

Mr. H. F. Oppenheimer, chairman of De Beers Consolidated Mines Ltd., officially set in motion, on June 10, the new £1,500,000 central diamond treatment and recovery plant at Kimberley. The function, attended by mining and industrial personalities from the Rand and elsewhere, as well as by many well-known Kimberley people, took place in the open in front of the new plant. Mr. Oppenheimer was invited by Mr. W. S. Gallagher, general manager of De Beers Consolidated Mines Ltd., first to unveil a plaque, commemorating the official opening, and then to press a button which set off a hooter. At this signal engineers set the huge plant in motion. The plant is centrally located to serve Du Toitspan, Bultfontein and Wesselton mines, as well as the De Beers mine should it come back into production at any time in the future. The ground from the mines will be

South-east view of the new central diamond treatment and recovery plant at Kimberley. The illustration shows the administration block and changehouse with recovery plant in background



brought to the plant by conveyor belt and endless rope haulage systems. It will be received into a feed control bin from which it is then distributed to the washing section in the required quantity or sent to the stockpile for future reclamation. The plant has a treatment capacity of 21,000 loads a day which is the equivalent of 20,000 tons a day and about 500,000 tons a month. As a result of new techniques and the most modern machinery, the plant will be operated by only 74 Europeans and 286 natives as opposed to 109 Europeans and 616 natives for the old plant.

★

A new oven has begun operating at the Larymna mines in Central Greece, producing nickel-bearing iron ore of a minimum nickel content of 10 per cent. The metal first passes through the first oven, which has been operating for some years and produces an iron ore of 5 to 6 per cent nickel content. The processing capacity of the second oven is 60 tons daily. The mines are owned by the industrial and mining magnate, Mr. Bodossakis-Athanassiadis.

★

Plans for an indefinite shutdown of the American Zinc Co.'s plant at Monsanto, U.S.A., were averted when members of the plant union voted to accept a 10 per cent cut in their production bonus, which has averaged about 28 c. per hour. Officials of the company said this would mean a saving of about $5,000 monthly and would permit switching production to lower-grade zinc, which was in fair demand.

★

The latest additions to the list of industries in Japan curbing output in view of export difficulties and domestic recession include oil refining and coal mining, which have announced decisions to restrict production by 6 and 5 per cent respectively. These measures are being taken with the full approval of the Japanese Government, which believes the recession is flattening out, but expects no immediate upturn. The restriction of coal output does not preclude the possibility of increased imports of certain types of coal which have become in short supply as a result of a strike of coal miners. Japan's coal production this year is now expected to total 52,843,000 tons against a previous estimate of 56,000,000.

★

China's steel output target for 1958 has been raised to 7,000,000 tons, or 33 per cent more than last year's production. Originally, the target had been set at 6,240,000 tons. The iron output target for 1958 has been correspondingly increased to 8,000,000 tons.

★

The Boliden Mining Co. reports that its output of copper rose in 1957 to 32,900 tons from 32,200 tons in 1956. Lead output improved from 23,300 to 25,000 tons, production of zinc concentrates from 54,500 to 69,400 tons, and of pyrites from 441,000 to 448,000 tons. Silver output rose from 63,700 kg. to a new peak of 81,600 kg., while production of gold was 4,557 kg. The company's prospecting activities in Sweden led to new finds of about 6,000,000 tons of ore, mainly in the Laisvall and Kristeneberg areas. On the other hand, prospecting in the company's African concession areas in Mozambique and Angola gave negative results and is to be discontinued.

★

Our Australian Correspondent writes that, despite the present inadequate price of gold, there are pointers to a possible increase of interest in gold mining. It is significant that these, possibly slight, pointers come at a time of considerable depression in base metals. In Western Australia, Western Mining Corporation has not slackened in its search for worthwhile gold occurrences, but the recent revival in interest is by small companies with, unfortunately, limited capital. In the last nine months there have been two new gold mining flotations in the State. Quite recently two companies, disappointed in the recent Mount Magnet field boom, have taken up new leases and production is reported from one. Attention is being given to the old and once rich Sandstone field. Prospectors and small party owners are becoming much more active and have been encouraged by good returns.

★

BIRTHDAY HONOURS

Among the awards in the Queen's Birthday Honours List is a barony to Sir (Thomas) Ellis Robins, president of the British South Africa Co., chairman of Central African Airways Corporation and Chartered Exploration, and director of a number of companies, including African Explosives and Chemical Industries, Anglo American Corporation of South Africa, and De Beers Consolidated Mines. The list of awards includes Mr. J. Cowan, principal electrical inspector, Mines Inspectorate, Ministry of Power (C.B.E.); Mr. Reginald William Mann, chairman of Victor Products (Wallsend) (O.B.E.); Mr. F. A. Millican, divisional industrial relations director, N. Division, National Coal Board (O.B.E.).

PERSONAL

Mr. T. A. Rogers has been elected president of the Institution of Mining Engineers for the year 1959-60 and will succeed Mr. H. A. Longden in January. Mr. Rogers was recently appointed Chief Inspector of Mines and Quarries in succession to Sir Harold Roberts.

★

Mr. H. F. Oppenheimer has been appointed a director of the Commonwealth Development Finance Co. He fills the vacancy created by the death of his father, Sir Ernest Oppenheimer.

★

Mr. G. Wright has joined the board of the South African and General Investment and Trust Co.

★

Mr. J. J. Boex, controller of associated interests of the British Aluminium Co., has been appointed a director of the company.

★

Lieut.-Comdr. G. W. Wells has been appointed managing director of the United Steel Companies Ltd. He will be responsible to the general managing director, Mr. A. J. Peech. Mr. A. Jackson has been appointed technical adviser on steelmaking. He retains his directorship of Appleby-Frodingham Steel Co., and joins the boards of Steel, Peech and Tozer, Samuel Fox and Co., and Workington Iron and Steel Co. Mr. J. D. Joy becomes a director of Appleby-Frodingham. He becomes deputy general manager on January 1, 1959.

★

We regret to report the death, on May 30, of Mr. William Hunt Eisenman, secretary and a founder member of the American Society for Metals. He was 73.

Mr. S. D. Davies, a director of Dowty Fuel Systems Ltd., Dowty Hydraulic Units Ltd., Dowty Seals Ltd., Dowty Mining Equipment Ltd., and Dowty Nucleonics Ltd., has been awarded the Royal Aeronautical Society's British Gold Medal for Aeronautics.

★

Mr. W. M. Frames has resigned from the board of De Beers Industrial Corporation Ltd. Mr. P. H. Anderson has been appointed in his place, with Mr. R. E. M. Blakeway as his alternate.

★

The second award in journalism made by the International Nickel Co. of Canada has been won this year by Mr. T. S. Green, from the U.K., who is studying in Canada under a Rotary International scholarship.

COMPANY EVENTS

The new Gresham transformer factory is to be opened by Mr. R. R. B. Brown, chairman of the Southern Electricity Board, on June 25. The event will be the occasion for a Press reception and open day. The new factory is designed to supply heavy power transformers up to 5,000 kVA. for the Canadian market.

★

Specialloid Ltd., who acquired the maior share capital of Powder Couplings Ltd., are now commencing the manufacture of powder couplings, the design of which will differ substantially from those manufactured by Stone-Wallwork Ltd.

★

Evershed and Vignoles Ltd. are to have direct representation in Scotland. The Scottish area office is at 13 Rutland Street, Edinburgh 1. Telephone Fountainbridge 3058.

CONFERENCES AND EXHIBITIONS

An international conference on gearing is being arranged by the Institution of Mechanical Engineers to be held in London from September 23 to September 25, 1958. About 36 papers will be presented.

★

The twelfth Ordinary General Meeting of the Malayan Employers' Association was held in Ipoh on May 28.

CONTRACTS AND TENDERS

Richard Sutcliffe Ltd., of Horbury, Wakefield, have received an order valued at more than £250,000 from Sir Lindsay Parkinson and Co. Ltd. The order covers the supply of equipment to handle 800 cu. yds. of overburden per hr. at a new opencast coal site, Dunraven Deep, in South Wales, and includes twelve 48 in. wide 80 h.p. conveyors, two multi-plate feeders, four 60 in. wide mobile conveyors, and three throw-off carriages and spreader conveyors. The estimated resources are 1,000,000 tons of coal and approximately 10,000,000 cu. yds. of overburden will have to be removed involving a maximum depth of excavation of about 270 ft. The site is expected to be in production for a period of five years.

★

The award of a $100,000 contract for helicopter use in Alaska by the Geological Survey has been announced by the U.S. Department of the Interior. It was made to Petroleum Helicopters. Inc., which submitted the lowest acceptable bid. $114.25 per flying hour. The contract provides for about 1,000 hours flying time during the 1958 flying season.

Machinery and Equipment

Pilot Plant for Agglomerating Minerals

Construction plans for a new prototype model of its grate-kiln system for agglomerating and heat treating metallic and non-metallic minerals and concentrates has been announced by Allis-Chalmers Manufacturing Co. To be valued in excess of $250,000, the new facility will be constructed at the company's Carrollville property, about fifteen miles south of Milwaukee, United States. Operation of the plant is planned for the autumn of this year.

The grate-kiln has already proved commercially advantageous for burning cement clinker. It also shows tremendous possibilities for agglomerating various iron ore concentrates and fines to prepare them for blast furnace or open hearth feed, and preparing phosphate rock pellets for electric furnace feed.

The new pilot plant will have improved, larger size grate-kiln equipment. Plans include improved feeding and pelletizing facilities over previous test models; a larger travelling grate section of commercial design, 13 ft. long and 22 in. wide; a larger capacity 42-in. dia. rotary kiln about 18 ft. long, and a newly designed circular cooler with increased flexibility and operating advantages.

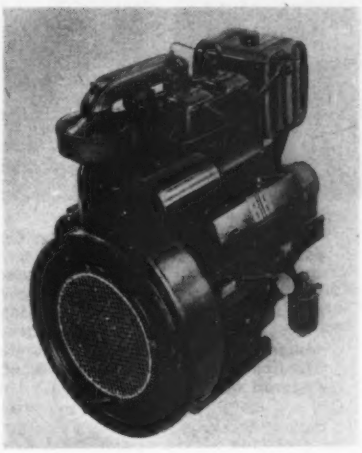
Plant layout itself is designed for maximum efficiency from a personnel standpoint. The new facility will also have complete, flexible and fully mechanized conveyor systems to receive and handle the multi-ton samples of various test materials which the cement, mining, chemical processing and other industries are seeking to heat treat or agglomerate.

EXPANSION IN DIESEL RANGE

The fundamental advantages of the air-cooled diesel over its water-cooled counterpart have already become apparent to the majority of small-engine users. Air-cooling has eliminated the maintenance associated with the water-cooled system and it has also removed many of the hazards of operation in extreme climatic conditions where plant must frequently work. In addition, the air-cooled unit attains its working temperature more quickly, resulting in longer life of cylinder barrels and piston rings. A further advantage is the extremely favourable power to weight and size ratio.

Ruston and Hornsby Ltd. claim to have exploited these fundamental advantages to provide significant advances in design. In the design of two new air-cooled engines, identified as the YWA and the YDA, are embodied all the design features which past experience has revealed to be desirable.

The Class YWA is a four-cycle air-cooled engine of 4 in. bore by 4½ in. stroke, manufactured in one- and two-cylinder sizes providing a power range from 6 to 24½ b.h.p. at an automotive rating over a speed range of 1,000 to 2,200 r.p.m. The British Standards rating is from 6 to 19 b.h.p. at 1,000 to 1,800 r.p.m.



The Class YDA is a four-cycle air-cooled engine of 4½ in. bore by 5 in. stroke, manufactured in two-, three-, four- and six-cylinder sizes, providing a power range from 16 to 110 b.h.p. at an automotive rating over a speed range from 1,000 to 2,200 r.p.m. The British Standards rating is from 16 to 87 b.h.p. at 1,000 to 1,800 r.p.m.

Above : The Ruston 2YWA twin-cylinder air-cooled diesel

Below : The Ruston 2YDA twin-cylinder air-cooled diesel

One of the more important advances in design is associated with the construction of the cylinder head and barrel. The cylinder head, basically the same design for both engines, is an aluminium "Y" alloy casting adequately finned for efficient cooling. The strength of the cylinder head lies in its box-like construction, the top deck and bottom deck being spaced apart by the two main strengthening members which incorporate the valve ports. This construction allows the main stream of the cooling air to pass through the centre of the head, thereby effectively cooling the fuel injector and the valves, and maintaining an even temperature throughout the head with the total elimination of any local hot spots. It will, therefore, be seen that this design has successfully catered for the removal of heat from the centre of the cylinder head which has always presented a problem in the direct injection air-cooled engine.

Greater versatility in application has been one of the main objectives of the Ruston design team. The result has been that the YDA engine permits the assembly of all the auxiliaries, such as fuel injection equipment, air, fuel and lubricating oil filters, oil filler and dipstick, on one side of the engine or the other. This allows the hot air to issue from the cylinders on whichever side of the engine is desirable. Furthermore, the YDA crankshaft is so designed to enable full power to be taken from either end and thereby caters for reverse rotation machinery. Similar versatility exists with the YWA engine in that full power can be taken from either end of the crankshaft and from the half-speed shaft. This engine also is made as a reverse rotation unit, which in addition to catering for the driven machinery, allows the direction of rotation of the starting handle to be selected in any of the three positions.

The YWA and YDA machines recently were presented to the public for the first time.

TANDEM CRUSHING AND SCREENING

A new type of portable crushing and screening plant, called Hammeroll plant, which uses a tandem arrangement of a roll crusher and a hammermill for high capacity secondary reduction, has recently been announced by Iowa Manufacturing Co., United States. The new plant is primarily a rock plant, designed for secondary crushing operations in quarries where abrasive material is not a problem.

The capacity of the plant depends upon conditions encountered. Extensive field tests in limestone quarries have proved the unit will produce from 450 to 500 tons per hour to handle the final crushing and grading of broken material from a big Cedarapids portable 3645 double impeller impact breaker primary plant.

With the closed circuit design, material fed to the 36 in. reciprocating feeder is conveyed to the 48 in. x 14 ft. triple deck horizontal vibrating screen which takes off specification-size material. Large oversize is directed to the hammermill, smaller oversize goes to the roll crusher,

and the crushed material is then recirculated to the screen for final sizing. Screen decks can be arranged to produce up to four finished sizes, including rock, chips, sand and fines.

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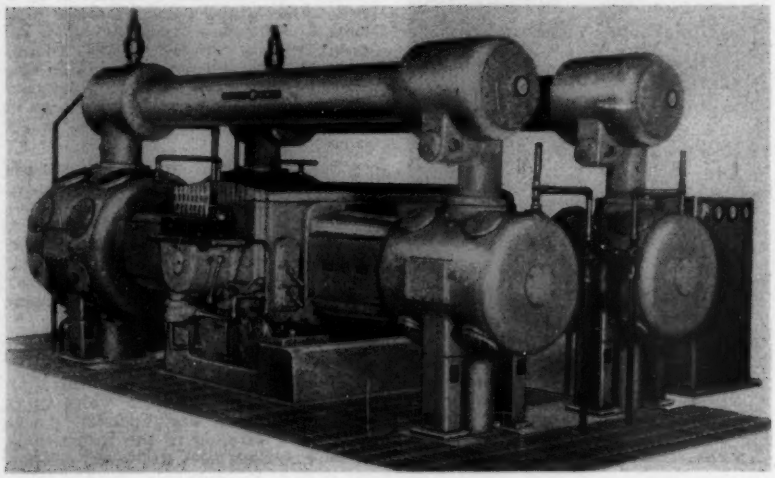

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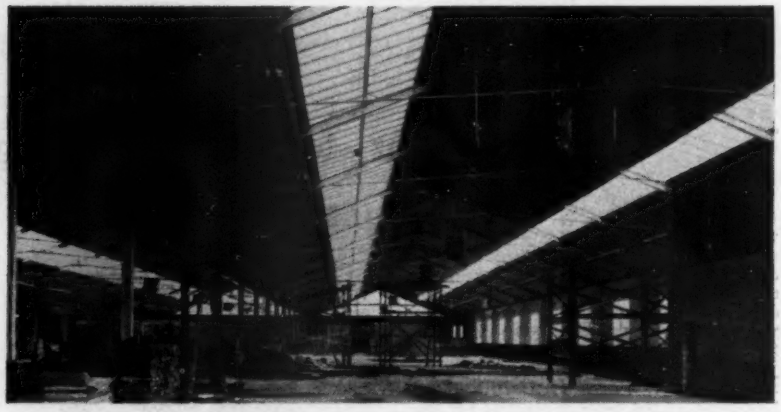

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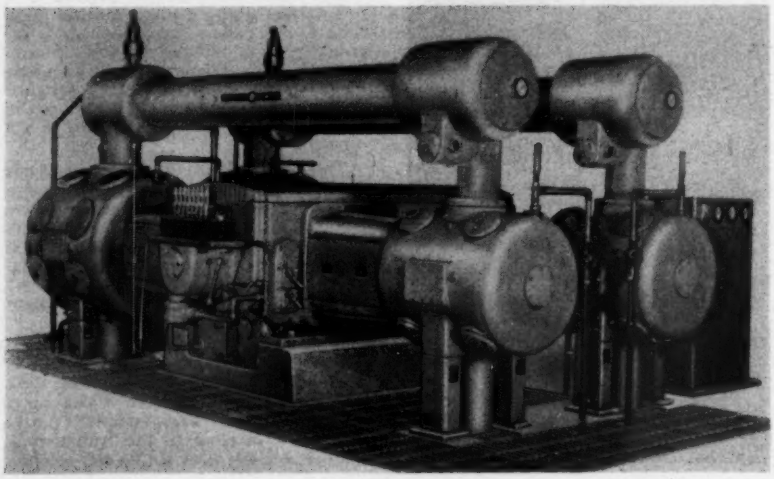

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Legislation has been introduced in the U.S. House of Representatives to re-impose the 1930 import duty of 4 c. per lb. on aluminium pig and ingot for one year only, starting on July 1, 1958. The Bill would also call on the White House to adjust negotiations under the Reciprocal Trade Act to bring the duties on other aluminium products imported into the U.S. "into line" with duties imposed on similar imports of aluminium into foreign countries.

An official of Alcoa has hinted that the wage increases scheduled for August 1 might lead to higher prices for aluminium.

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The price of Russian aluminium in London apparently is still being indicated at about £170 per ton c.i.f. U.K. or possibly even £169. It is understood, however, that metal of other origins is being offered much cheaper at down to about £165 c.i.f. In fact, some Yugoslav aluminium is believed to have been offered at as little as £162, with payment after arrival. Cheaper offers are also said to be emanating from a number of other countries, including Switzerland, Norway and Hungary. These prices compare with the Canadian price to U.K. consumers of £180 per ton delivered, less the "loyalty" discount of £3 12s. per ton.

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The prospect of Soviet collaboration for the development of Yugoslavia's extensive bauxite deposits in Montenegro, including the erection of a large aluminium works (annual capacity 50,000 tonnes of metal) appears to have become more remote than ever as a result of the ideological and political dispute between the two countries. A Soviet note to Belgrade said that the £62,500 credit to Yugoslavia for construction of this aluminium plant would be postponed for five years.

★

Western Mining Corporation Ltd. proposes to prospect for bauxite in the Darling Ranges, in the south-west of Western Australia. Directors say in the latest quarterly report that the company has been granted a temporary reserve to prospect the area.

A party will soon be in the West Kimberley district to carry out geological and geophysical work on the company's new copper prospect there. The company has a temporary reserve of 2,000 square miles in the Kimberleys, where four outcrops totalling 6,000 ft. long, carrying copper, have been located.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Copper at over £200! That is the main item of news of the week and it represents a rise of £20 per ton since the quotations of June 5. It would, therefore, seem proper to spend a little time in trying to analyse a move of such unexpected magnitude. The movement reached a crescendo on the New York Commodity Market on Tuesday, which was followed on Wednesday by a rise of over £10 per ton on the London Metal Exchange, and this movement brought about a rise in the U.S. customs smelters' price to 26 c. per lb.

WHY COPPER HAS RISEN

It has been known for some time that speculators in America had been advised to buy copper, and the turnovers on the Commodity Exchange have shown a steady increase during recent weeks. As this buying increased, sellers on the Commodity Market started to make corresponding purchases in London at a reasonable differential and this, combined with a slightly better demand from consumers, resulted in what can only be termed a "runaway" market. The movement was assisted by the customs smelters being unable to purchase sufficient scrap to cover their sales and their willingness to raise their price even to a level above that of the primary producers.

Yet the main item of news which sparked off the final rise was the announcement in Washington that a plan was being put before Congress covering the sale of 150,000 tons of copper up to 27½ c. per lb. during the next year. It is not clear whether this plan is likely to receive assent, as it will mean the voting of a large sum of money which may not be forthcoming, and it is not known whether the reimposition of the duty or the application of a higher duty is in any way involved in the proposal. It is also not clear whether the proposal is an alternative to the so-called "Seaton Plan", shortly to be discussed in Congress, which covers not only copper, but lead, zinc and two other minerals.

One large question which will have to be answered is what are likely to be the demands of the U.S. lead and zinc producers, if, contrary to all previous statements, the U.S. Administration embarks on a new programme for stockpiling copper?

The London market has been extremely active and the copper stocks showed a decrease over the previous week with the contango remaining at about its previous level. The behaviour of the copper market is a clear indication that output and demand must be almost in balance, and if producers are prepared to hold on to their stocks and consumers show any inclination to replenish stocks, even in face of the coming holiday period, then the market can go considerably higher. Experience whispers, however, that a rise such as has been experienced over the last few weeks is of such a magnitude as to call for some corrective movement for consolidation purposes.

GROWING SHORTAGE OF STRAITS TIN

The tin market has pursued an unshaken course, with cash metal still being bought by the buffer stock manager and three months showing little inclination to rise above £735 per ton. It is apparent, however, that the shortage of Straits tin is developing and it would not be surprising if the premium for this class of tin increased.

The latest figures from the United States showed that the average daily rate of tin consumption in March was some 6 per cent below that of February, and tin consumption during the first quarter of 1958 was 20 per cent less than the corresponding period of 1957. By the end of March, tin stocks also showed an increase over the beginning of the month.

The International Tin Council statistics show that world production of tin-in-concentrates fell in January to 12,900 l.tons as compared with 16,200 l.tons in December and that the production in February fell still further. Smelter production of tin metal in January was some 1,000 tons higher than December and preliminary indications show that there was little change during the first quarter of the year. Consumption during February showed a slight tendency to increase. Figures issued by the International Tin Council also showed that against a permissible export amount of 27,000 tons in the first controlled period December 15, 1957, to March 31, 1958, the actual exports did not exceed this figure by more than 1 per cent. It is expected that a similar strict adherence to the permitted exports will be maintained during the current period. On Thursday morning the Eastern price was equivalent to £752½ per ton c.i.f. Europe.

THE LEAD-ZINC SITUATION

Whereas the lead market has remained relatively unshaken by the events in copper, zinc has been appreciably affected and, as has been mentioned before, it would not be surprising if the two quotations came very close together at a figure somewhat under £70 per ton. Demand remains uninteresting in lead with the battery trade being specially quiet at the moment.

In America during March stocks at both secondary and primary producers increased, but consumers' inventories remained almost unchanged. Consumption of lead in the first quarter of 1958 at 231,900 s.tons was approximately 21 per cent less than the comparable period of 1957.

The zinc figures, however, show that in America the stocks at the end of May were some 20,000 tons higher than at the end of April with both production and shipments remaining almost unchanged.

Closing prices are as follows:

	June 5		June 12	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£183½	£183¾	£199	£199½
Three months	£185¼	£186	£201	£201½
Settlement	£183½		£199½	
Week's turnover	8,450 tons		17,225 tons	
LEAD				
Current ½ month	£71½	£71⅝	£74	£74⅛
Three months	£71⅝	£72	£75⅛	£75⅛
Week's turnover	3,025 tons		6,600 tons	
TIN				
Cash	£730	£730½	£730	£730½
Three months	£734½	£735	£734	£734½
Settlement	£730½		£730½	
Week's turnover	1,200 tons		1,265 tons	
ZINC				
Current ½ month	£62⅜	£62⅝	£65⅛	£65¼
Three months	£62¾	£63	£65¼	£66
Week's turnover	4,350 tons		9,150 tons	

London Metal and Ore Prices appear on page 705.

Mining Finance

Siamese Tin Looks Ahead

It is well known that of the tin-producing countries, Thailand is particularly severely hit by the present quota restrictions. This was a result of the method of assessment of full production, which took less than full account of rising or declining outputs. Hence last month's statement by Sir Ewen Fergusson, chairman of the Straits Trading Co., suggesting that Malaya's domestic assessment was around 12 p.c. too high, and hence the fact that Siamese Tin's permitted 1958 production is only 35 per cent of the 1957 output, in spite of the fact that a small proportion of the Syndicate's output comes from Malaya.

This is the background to this week's annual report from the Siamese Tin Syndicate. The sharply reduced profits from 1957 operations were reported in these columns on May 30. Suffice it to say that before a much reduced taxation charge, and a substantial tax write-back (both resulting from the O.T.C. provisions), only £387,061 was earned, compared with £770,714 in 1956. More important are the Syndicate's plans for the future, and it is apparent from the statement by Mr. W. R. B. Foster, the chairman, that the Syndicate has every intention of being in a stronger position after the present hiatus than was the case before it.

Thus, of the company's ten dredges, three have been converted from steam to electricity during the last twelve months. Two of these have also been largely rebuilt (at a cost of over £450,000), while the third has had its capacity increased. Similarly, prospecting has continued unchecked, and during 1957 about 22,000,000 cu. yds., all contiguous to present paddocks, have been added to reserves, which now total almost 150,000,000 cu. yds., sufficient for about ten years' working at the 1957 rate.

Mr. Foster displays no false optimism towards the future. The burden of absorbing Russian and, possibly, Chinese tin at a time when the U.S. offtake from current consumption is abnormally low is no light one, and he believes that tin restriction must continue for some years to come. And, bearing in mind this and the inexorable upward pressure of costs, he can see no escape from reduced profits during the years immediately ahead. Nevertheless, the Syndicate's liquid position remains strong, and when the metal is once more able to stand on its own feet, Siamese Tin may well find itself in an exceptionally sound, competitive position.

LONDON MARKET HIGHLIGHTS

Copper shares, which have recently been extremely responsive to any change of outlook in either the metal or the course of Wall Street, were strangely unmoved by the gathering strength of the metal price during the first days of the past week. It was not until Wednesday when copper in London soared over £11 a ton to £202 that the share market really came to life, business rapidly increasing as prices advanced on a broad front. Practically all of the leading issues reached new " highs " for the year and at the time of writing look set to go even higher. Outstanding advances were seen in Nchanga which rose 7s. 6d. to 210s., Messina shares, 12s. up at 96s. 3d. and the options 9s. 3d. higher at 53s. 9d.

The firmness spread to Lead-zincs where it was thought possible that a similar U.S. stockpile support plan to that suggested for copper might be devised for U.S. lead and zinc. New Broken Hill were a good market at around 32s. 9d. and among other gains, Consolidated Zinc moved up to 44s. 3d.

It was hardly surprising in the circumstances that the Tin share market remained unhappily out of the picture. The metal price stayed obstinately at around the buffer stock support level and there was also more discouraging company news. That from Siamese Tin, for instance, brought the shares back from 7s. to 5s. 10½d. In Nigeria, the Bisichi mine was obliged to cut its dividend from 40 per cent to only 10 per cent and the shares wilted again, falling to 3s., the price equal to the lowest for several years.

Diamonds, taking a lead from Wall Street, remained quite steady, but it remains to be seen whether this trend can persist in view of sales figures recorded for the first five months of the year.

The Kaffir market provided the most disappointing section of mining markets. The market started the week fairly promisingly with good buying being reported in Free State Geduld. Interest then seemed to peter out, particularly as speculative money was attracted by what looked to be a more promising haven in copper shares. By and large the first of the half-yearly batch of gold mining dividends were considered to be up to expectations. The cut in the Vaal Reefs distribution surprised many observers but the shares lost little ground on balance, thanks to more hopeful views being taken about the likely payment for the full year.

Dealings began in the Presidents Brand and Steyn new issue shares. A start was made at the respective prices of 6s. 9d. premium and 3s. 9d. premium, but the onset of both Cape and Continental selling soon lowered them to 4s. 9d. and 1s. 9d. Free State Saaiplaas combined units were split and dealings commenced separately in new shares and convertible notes; little change occurred in the price of shares but in the notes an anticipated wave of selling from speculative holders of them in the previous unit form failed to materialize and the notes soon improved to 9s. from their initial 8s.

One notable feature in a not uneventful week was provided by the highly volatile shares of St. John d'El Rey. On Monday a sudden U.S. demand sprung up and in a very narrow market the shares soared to a high for the year of 63s. 6d. before closing the day with a rise of 8s. at 61s. 3d. The unexplained demand then expired as quickly as it had appeared and St. John d'El Rey promptly reacted to 57s. 6d.

MR. BEATTY EXCEEDS EXPECTATIONS

Selection Trust is almost unique among the major London mining finance houses in that its prosperity depends largely, though not entirely, upon base metals. The holding in American Metal gave it substantial interests in the Copperbelt and in the Tsumeb Corporation, while the Amco-Climax merger last December added commitments in molybdenum. Lithium, through Bikita Minerals and American Lithium, is another important constituent of the Selection Trust investment portfolio. There is also a substantial investment in C.A.S.T., producing diamonds in Ghana and Sierra Leone, and the South African gold mining industry is represented by holdings in Vaal Reefs and Western Holdings.

From this résumé it must be apparent that Selection Trust could expect a major drop in income over the past year, and Mr. A. Chester Beatty, the Trust's chairman, gave a warning to this effect last June. He did, however, add the proviso that as far as could be seen from the tentative estimates then available, it was possible that the 1957 dividend rate of 7s. would be maintained in 1958. Nevertheless, no surprise would have been occasioned if, in fact, the continued weakness in base metals had forced Mr. Beatty to bow to expedience by abandoning the idea.

Mr. Beatty has, however, kept his word. In spite of a fall in dividend income from £4,534,811 in the year to March 31, 1957, to £3,127,366 this year, which has resulted in net profits declining to £1,506,230 from last year's £2,221,878, the dividend rate has been maintained. To do this has meant a drastic cutting back of other appropriations, and whereas last year £1,150,000 was put to various reserves, this year it has only been possible to allocate £350,000, of which £100,000 went to investment reserve to counterbalance a depreciation of £53,439 in investment values.

Mr. Chester Beatty's views on the outlook for base metals (which must, presumably, be more optimistic than most) will make interesting reading when the accounts are published on July 1.

DIAMOND SALES LOWER

Speaking at Wednesday's meeting in Kimberley of De Beers Consolidated Mines, Mr. H. F. Oppenheimer, the chairman, revealed that diamond sales had continued to fall away during the last two months. Total sales for the first five months of the year amounted to £24,838,257, compared with £31,463,470

in the corresponding period of 1957. £3,000,000 of the decline was attributable to lower gem sales, and the other £3,500,000 to industrial stones, the market for which, Mr. Oppenheimer said, was continuing weak.

Mr. Oppenheimer also announced that the prospecting operations on Annex Kleinzee have proved successful, and that De Beers will, therefore, proceed with mining operations on the farm.

MORE KAFFIR DIVIDENDS

The June Kaffir dividend season continued this week with the announcement of distributions from the Rand and Klerksdorp producers of the Consolidated Gold Fields and General Mining Groups. Wit Nigel, the small Far East Rand producer, also made its declaration, returning to the dividend list for the first time for two years.

Among the Gold Fields companies, three of the oldest mines (Rietfontein, Robinson Deep, and Simmer and Jack) are notable absentees. This is a result of the changed policy announced by the respective chairmen last month, under which future distributions were to be made in the more palatable form of returns of capital. The first of these has been announced simultaneously with the dividend declarations of the other mines in the group, and amount to 1s. 6d. from Robinson, 1s. from Rietfontein, and 6d. from Simmer. These payments compare very favourably with what might have been expected by way of dividend. Doornfontein's failure to better the 1s. paid last December may well cause some disappointment. This must be ascribed to the continued high level of capital spending, and to the need to provide for the redemption of £700,000 debentures during the next thirteen months.

The General Mining group has always tended to view dividends on an interim and final basis, and from this point of view all this week's payments from this organization must be regarded as satisfactory, particularly that of Stilfontein.

Company	*Dec. 1956*	*June 1957*	*Dec. 1957*	*June 1958*
	s. d.	*s. d.*	*s. d.*	*s. d.*
Gold Fields				
D'rnf'nt'n	—	6	1 0	1 0
Libanon	3½	3½	3½	3½
Luipaards V	10½	1 0	1 1	1 1
Sub Nigel	2 4½	1 9	1 6	1 6
Venterspost	10½	10½	10½	10½
Vogels	1 6	1 4	1 2	1 0
W. Drie	3 0	3 3	3 6	3 9
General Mining				
Buffels	—	—	1 6	1 6
S. R'd'pt.	1 1½	1 1½	1 1½	1 1½
Stilfontein	6	1 0	1 10½	1 10½
W. Rand C.	2 3	2 0	2 3	2 0
Others				
Wit. Nigel	—	—	—	1½

Three finance companies under the aegis of these two groups also announce good payments. West Wits is to pay 1s. 7½d., making a total of 3s. 3d. for 1957-58 (2s. 9d. last year), while New Pioneer is to distribute 2s. 6d. per share for the same period, against 1s. in 1957. East Rand Extensions is declaring an interim for 1958 of 9d. Last year a single distribution of 1s. 3d. was made.

WHAT IS NATIONAL MINING WORTH?

There can be no doubt that the 1s. 6d. offer by Premier Oilfields for National Mining shares was a considerable underestimation of their real worth. Indeed, it can be shown that on quick assets and quoted investments alone, 1s. 6d. is unrealistic. In any case, an accurate estimate of National Mining's value must take into account not only these, but three other factors, all more or less imponderable at present.

The first, and probably the most important, is the value to be placed on National Mining's unquoted investments. These consist, *inter alia*, of shares in three Canadian companies, Loder's Lime, Alberta Ytong and Ladco (this last being a land acquisition and development company operating in the Winnipeg area), a substantial holding in Mines Development Syndicate, developing a lead-zinc property in Eastern Nigeria, and a holding in the American Ytong Syndicate. At March 31, 1957, these stood in the company's books at £172,565, this figure including advances to two of the above companies, and a small holding of Rio Tinto Debentures, since sold. All these investments have reached no more than the development stage, and all have been hit to some extent by the deceleration of U.S. economic activity. Taking a line through last year's statement by Major General Richards, £100,000 would seem to be a fairly conservative estimate of their real, as opposed to immediately realizable, value.

The second imponderable is the tax losses which National Mining is believed to be carrying forward. It is impossible to put even an arbitrary assessment on these, and they are best left out of a valuation. Nevertheless, they could amount to a very substantial sum, bearing in mind that National Mining was carrying forward a debit balance of well over £1,000,000 five years ago.

Lastly, the oil royalties, ostensibly the object of Premier's bid. These fall into

Rand & Orange Free State Returns for May

Company	*May 1958* Tons (000)	Yield (oz.)	Profit† (£000)	*Year ends*	*Current Financial Year — Total to date* Tons (000)	Yield (oz.)	Profit† (£000)	*Last Financial Year — Total to date* Tons (000)	Yield (oz.)	Profit† (£000)
Goldfields										
Doornfontein	88	36,630	191·0	J	944	387,595	2138·8	848	340,719	1652·8
Libanon	100	22,972	54·8	J	1,208	252,490	588·9	1,082	242,731	605·5
Luipaards Vlei	70	12,375	5·0	J	783	140,091	74·5	892	160,062	109·5
Rietfontein	22	4,987	12·4	D	111	25,353	67·5	123	28,289	80·3
Robinson	72	15,473	5·1	D	359	76,647	29·8	369	74,560	37·4
Simmer & Jack	88	16,687	14·2	D	428	83,003	71·6	473	87,356	90·4
Sub Nigel	66	16,070	25·3	J	724	182,013	298·0	727	200,590	466·2
Venterspost	127	30,004	56·9	J	1,337	321,926	508·3	1,371	315,536	722·2
Vlakfontein	50	17,613	85·4	D	246	86,692	418·6	245	87,827	423·5
Vogels	96	21,274	42·9	D	479	107,792	222·5	496	115,376	292·0
West Drie	78	74,227	603·8	J	832	797,900	6607·1	825	776,224	6388·3
Anglo American										
Brakpan	129	16,634	14·5	D	614	83,238	60·3	531	90,641	58·1
Daggas	238	49,261	256·8	D	1,122	235,346	1215·8	1,123	248,165	1356·4
East Daggas	92	15,281	28·6	D	449	74,622	135·4	473	78,069	168·8
F.S. Geduld	68	49,112	345·8	S	518	370,880	2540·6	398	484,841	1071·8
Loraine	72	13,266	L22·1	S	518	97,770	L147·8	496	957,390	L52·9
President Brand	88	65,843	535·5	S	607	453,526	3658·2	490	374,933	3080·0
President Steyn	98	37,423	199·3	S	749	320,607	1632·2	714	277,218	1586·7
S. A. Lands	91	18,473	53·1	D	437	99,438	252·5	442	96,348	329·4
Springs	127	14,074	8·9	D	627	69,835	41·0	623	68,659	28·3
Vaal Reefs	72	32,400	178·9	D	342	153,443	865·4	287	124,907	732·7
Welkom	88	26,082	74·6	S	664	196,397	538·3	688	173,647	381·9
Western Hldgs.	98	54,739	410·6	S	769	409,838	3728·9	734	335,683	2182·2
West Reef Ex.	114	26,909	65·0	D	555	130,023	296·8	609	131,363	315·8
Central Mining										
Blyvoor	112	64,485	441·2	J	1,143	672,092	4735·0	1,161	657,896	4777·5
City Deep	148	28,250	10·1	D	717	136,421	42·8	733	145,024	90·3
Cons. M.R.	142	21,894	13·7	J	1,713	244,832	117·4	1,827	253,474	98·0
Crown	238	36,130	16·2	D	1,137	174,134	79·2	1,205	176,263	L20·4
D. Roodepoort	187	33,832	51·8	D	891	161,123	248·7	915	160,511	258·8
East Rand Prop.	230	58,705	152·0	D	992	280,920	737·1	1,063	277,973	575·1
Harmony	78	30,826	126·3	J	874	621,047	1673·0	866	308,350	1743·9
Modder East	148	13,779	2·0	J	1,507	149,657	26·5	1,531	157,737	24·5
Rose Deep	60	7,273	3·1	D	285	38,346	20·8	246	38,044	1·2
J.C.I.*										
E. Champ d'Or	12	345	L27·4	D	60	1,531	L132·0	60	1,690	L129·2
Freddies Cons.	55	14,423	L58·0	D	245	77,203	L152·0	284	70,967	L119·2
Govt. G.M.A.	64	11,052	1·0	D	313	53,889	5·9	628	103,207	L67·1
Randfontein	34	5,127	5·0	D	141	23,190	25·2	391	65,699	74·7
Union Corp.										
East Geduld	135	41,525	288·1	D	628	193,125	1310·4	689	212,062	1489·5
Geduld Prop.	83	13,086	8·9	D	406	64,015	47·5	517	81,878	133·0
Grootvlei	205	43,571	221·1	D	970	206,632	1051·1	967	206,866	1085·1
Marievale	74	19,348	85·6	D	354	92,948	409·9	354	93,049	416·7
St. Helena	119	34,941	187·3	D	574	169,035	803·4	579	168,855	928·5
Van Dyk	78	14,991	33·2	D	376	68,761	123·0	388	64,639	19·9
General Mining										
Buffelsfontein	117	39,081	182·5	J	1,216	399,775	2056·8	467	137,525	526·3
Ellaton	32	7,467	32·3	D	159	36,812	154·4	162	34,429	67·4
S. Roodepoort	30	7,121	25·7	J	322	76,099	275·5	318	74,252	260·8
Stilfontein	112	55,496	382·2	D	547	271,479	1687·3	478	205,588	1280·5
W. Rand Cons.	133	19,080	16·5	D	728	88,964	60·0	715	102,803	75·4
Anglo-Transvaal										
Hartebeestfontein	85	46,750	315·5	J	931	510,800	3431·5	930	427,078	2647·9
N. Klerksdorp	10	1,170	L7·4	D	51	5,470	L38·6	52	6,236	L25·9
Rand Leases	174	25,665	5·0	J	1,857	280,944	74·9	1,765	275,499	L154·0
Village M.R.	29	4,495	L2·6	J	344	56,074	41·8	362	58,404	90·3
Virginia O.F.S.	101	26,422	41·5	J	1,102	275,017	588·2	1,025	240,748	668·6
Others										
N. Kleinfontein	88	10,353	L12·4	D	456	53,888	L23·7	489	56,348	L47·6
Wit Nigel	18	4,352	6·9	J	196	47,148	58·8	198	39,883	85·0

Gold has been valued at 248s. 10d. (April 248s. 8d.) per oz. fine. L indicates loss. † Working Profit. *Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

two groups: a royalty of 2½ per cent on the gross proceeds from the sale of oil and gas produced from a comparatively untested area of 13,452 acres; and one-quarter of all Premier's royalties payable on oil produced from certain other areas in Trinidad. The first of these has so far only produced £327 for National Mining, but the potentialities would appear to be at least as good as those for the second, which has brought in an average of about £1,500 annually over the past three years. Assuming (arbitrarily, but probably conservatively) an income of £3,000 annually for the next 15 years from the two sources combined, the present value of these royalties must be something of the order of £25 - 30,000, according to the rate of interest assumed.

Thus, the total value of National Mining Corporation, once more emphasizing that the estimate probably errs substantially on the conservative side, is roughly:

Net current assets	£71,420
Market value of quoted investments	£270,220
Unquoted investments ...	£100,000
Oil royalties	£30,000
Tax losses (nominal valuation)	£1,000
	£472,640

On an issued capital of 2,722,510 shares, this works out at a fraction under 3s. 6d. per share, or more than double the Premier offer. In the circumstances, the "don't sell" advice given by the National Mining directors would seem sound, as long as the investor is prepared to wait some time for his reward. If not, there is a lot to be said for taking the 1s. 9d. or so at present available on the open market.

Financial News and Results

East Rand Consolidated.—Net taxed profit of East Rand Consolidated in the year to December 31, 1957, was £62,866, an increase from £58,237 in 1956. In his circulated statement, Mr. C. J. Burns, the chairman, says that negotiations for the take-over of a British industrial company (which were at an advance stage) have been broken off in view of the uncertain economic climate. The dividend for the year is unchanged at 1½d. per share.

Tavoy Lives From Hand to Mouth.—In view of current metal prices and the limited payable reserves available in the Theindaw section, Tavoy Tin Dredging will not carry out the major modifications to the dredge which would normally be necessary, but will continue dredging on a month-to-month basis by effecting temporary repairs. It is emphasized that dredging may end at very short notice, due to the precarious state of the dredge. Operations by the "Thistle" dredge are continuing at well below the pre-war rate, but the results must be accepted as average for present-day Burma. In spite of repeated government assurances that foreign capital, and mining in particular, is welcome in Burma, the company says that governmental obstacles are multiplying to the point where mining operations could be brought to a halt by the difficulties.

Tekka-Taiping Liquidates.—The resolution to wind up Tekka-Taiping was passed at the extraordinary meeting held on June 2. An initial distribution of 7s. per share is anticipated shortly.

Publications Received

The three-language (German, English, French) edition of the *Universal Decimal Classification*, which is to rank henceforth as the International Standard Abridged edition of U.D.C., has just been published in this country by the British Standards Institution.

★

British Ropes Ltd. has produced the thirteenth edition of its Blue Pocket Catalogue (Publication No. 74). This has been completely revised in accordance with the current British Standards and also includes information for all classes of locked coil ropes. In addition to many pages of breaking-strength tables to the new British Standards, this publication includes data regarding elementary maintenance fittings and official regulations.

★

The four revised British Standards for Mining and Engineering Ropes are fully explained in a booklet (No. 147) issued by British Ropes Ltd. The introduction of these standards has inevitably brought changes in specifications. Sizes and constructions have been rationalized by the introduction of grouping systems, designations modified, and sizes given in diameters instead of circumferences as hitherto. All these points are adequately explained in the booklet, which enables the reader to assess the main differences between the old standards and the new. The publication will materially assist every rope user in the ordering of wire rope for colliery winding and haulage, cranes, excavators, lifts, and hoists.

★

Year Book and Guide to Southern Africa (price 10s. 6d., by post 12s. 3d.) contains 750 pp. of text, a 48-p. atlas in colour by John Bartholomew and Son Ltd., a tour-planning map, town plans, etc. The book deals with the Union of South Africa, the Federation of Rhodesia and Nyasaland, South West Africa, Basutoland, Bechuanaland, and Swaziland. *Year Book and Guide to East Africa* (price 8s. 6d., by post 9s. 9d.) contains over 350 pp. of text, town plans, and route diagrams, as well as a 16-p. atlas and a folding map of Africa in colour, both by John Bartholomew and Son Ltd. The book deals in detail with Kenya, Uganda, Tanganyika, Zanzibar, Portuguese East Africa, and Mauritius; it also covers less fully the Sudan, Eritrea, Somaliland, Ethiopia, Congo, Madagascar, Reunion, and the Seychelles Islands. The year-books are published by Robert Hale Ltd. for Union-Castle Line.

★

A report of an investigation of groundwater resources of the Ruskin area of Hillsborough County, Fla., U.S., was released recently by the Department of the Interior. The Suwannee limestone and Tampa formation are the principal sources of artesian water in the area. The water in these formations is replenished by rainfall in western Polk County and eastern Hillsborough County, and it is confined under pressure by relatively impermeable strata within the formations and the overlying Hawthorn formation.

The artesian water in the Suwannee limestone and Tampa formation has been contaminated, to some extent, by salty water in a narrow zone along the coast north of the Little Manatee River. Contamination in the area south of Adamsville is apparently due to residual sea water that entered the rocks during Pleistocene time, because the artesian head along the coast is sufficiently high to prevent encroachment of water from Tampa Bay at the present time. Contamination in the vicinity of Adamsville and northward is probably due, in part, to both residual Pleistocene sea water and encroachment of water from Tampa Bay during recent decades.

The report contains basic data on the geology of the Ruskin area and the occurrence, movement, and chemical character of artesian water in the area. Maps show the piezometric (artesian-pressure) surface, depth to water below land surface, chemical character of the water, and structure of the principal water-bearing formations. Records of more than 600 wells also are included.

Entitled "The artesian water of the Ruskin area of Hillsborough County, Fla.", the report will be published by the Florida Survey. Pending publication, typewritten copies may be inspected in the Geological Survey offices at 1242-G General Services Administration Building, 18th and F Streets, NW., Washington, D.C., and Gunter Building, Tennessee and Woodward Streets, Tallahassee; and at the Florida Geological Survey, Tallahassee.

★

A new edition of the Directory of Employers' Associations, Trade Unions, Joint Organizations, etc., corrected up to January, 1958, has been compiled by the Ministry of Labour and National Service. It is available from H.M. Stationery Office at 8s. net (by post 8s. 7d.) and copies can be obtained from any Stationery Office bookshop or through any bookseller. *The Directory* contains the title and name and address of the secretary of every organization in the United Kingdom of employers, of workers, and of employers and workers jointly, directly concerned with the negotiation of wages and working conditions, or which provides representatives on bodies which are so concerned. Within these three main sections of the Directory, the organizations are grouped according to the industries in which they function. Indexes are provided for each of the three sections. In the case of trade unions, an indication is given of those which are affiliated to the Trades Union Congress and the Scottish Trades Union Congress and of those which are registered under the Trade Union Acts.

Professional Directory

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METAL PRICES

Aluminium, 99.5%, £180 per ton
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Arsenic, £400 per ton
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Cerium (99% net), £16 0s lb. delivered U.K.
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Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
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Metal and Mineral Trades

MACHINERY & EQUIPMENT DIRECTORY

Buyers will find the addresses of the companies listed below in the advertisement pages of our recent issues. Alternatively, enquiries may be addressed to *The Mining Journal*, 15 Wilson Street, London, E.C.2. Phone : MONarch 2567.

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